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BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

ORIGINAL
FILE

In the Matter of

Amendment of Section 90.239 of the
Commission's Rules to Adopt Permanent
Regulations for Automatic Vehicle
Monitoring Systems

RM No. 8013

TO: THE COMMISSION

**REPLY COMMENTS OF NORTH AMERICAN
TELETRAC AND LOCATION TECHNOLOGIES
IN SUPPORT OF PETITION FOR RULEMAKING**

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EXECUTIVE SUMMARY

North American Teletrac and Location Technologies, Inc., through their joint venture PacTel Teletrac ("Teletrac"), reply to the fifteen comments filed on July 23, 1992, in response to its Petition for Proposed Rulemaking. Several commentors oppose granting Teletrac's Petition. These commentors, however, lack technical support for their positions, mischaracterize Teletrac's proposal, or are merely attempting to delay the promulgation of permanent AVM rules. The weight of the comments strongly support the issuance of a Notice of Proposed Rulemaking and support the rules proposed by Teletrac. (§§ 1 - 6 and 10 - 25).

Teletrac's proposal for co-channel separation between wideband pulse-ranging AVM systems generated the greatest number of comments. In this Reply, Teletrac reiterates why co-channel separation in the shared 904 - 926 MHz band is essential to a commercially viable wideband system. Teletrac is not seeking exclusive use of 904-912 and 918-926 MHz wideband segments. The band will continue to be shared and the hierarchy of uses currently in place will remain.

Without a co-channel separation requirement, spectral inefficiency will lead to an overuse of a public resource and consequently deprive the public of a significant benefit. The inefficiency of one of the commentors, Amtech, illustrates the lack of incentive to operate efficiently without Commission action to assure sound frequency management. (§§ 27 - 31). This point is further illustrated by Teletrac's efforts to eliminate interference from narrowband, proximity-sensing systems operating in the frequencies designated in the interim rules for wideband use.

(¶¶ 32 - 38). Teletrac and other commentators supporting Teletrac's proposals agree that geographic separation of co-channel systems is essential to successful implementation of wideband AVM systems in the continuing shared environment. (¶¶ 39 - 41).

Teletrac also corrects the mischaracterizations of its proposal as anticompetitive. Teletrac's proposal would not create a "duopoly." Significant competition exists for the services offered by wideband pulse-ranging AVM systems and Teletrac's proposal could not "impede competition" because Teletrac cannot exercise market power. Indeed, according to Professor Richard Schmalensee, an internationally known economist and a former member of the Bush Administration's Council of Economic Advisers, Teletrac's proposal would foster a competitive marketplace. (¶¶ 42 - 46).

Teletrac explains that, contrary to the assertions of a number of commentators, open entry and sharing between AVM providers is not technically or commercially feasible and would inhibit innovation in this environment. The Commission has recognized that unsupported claims of frequency sharing capability should not be countenanced and that co-channel separation creates efficiency in certain spectrum environments. (¶¶ 50 - 54). The objections voiced by the narrowband system licensees are merely protectionism and, if listened to, would inhibit innovation. (¶¶ 47 - 49).

Teletrac replies to comments generally supporting the need for a forward link, expansion of the definition of AVM and the need for type acceptance. (¶¶ 55 -

60). Finally, Teletrac briefly rebuts statements made by the commenting parties about the applicability of sections 7 and 332 of the Communications Act and the Surface Highway Transportation Act of 1991 to Teletrac's Petition for Proposed Rulemaking. (¶¶ 61 - 63).

Nothing in the comments filed should dissuade the Commission from moving swiftly to issue a Notice of Proposed Rulemaking incorporating Teletrac's proposals. Realization of the benefits to the public through fair and expeditious action should not be delayed.

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ATTACHMENT A: Affidavit of Jeffrey Krauss

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EXHIBIT 1: Amtech Corporation's 1991 Annual Report

EXHIBIT 2: Amtech Corporation's 1991 10-K

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**REPLY COMMENTS OF NORTH AMERICAN
TELETRAC AND LOCATION TECHNOLOGIES
IN SUPPORT OF PETITION FOR RULEMAKING**

1. North American Teletrac and Location Technologies, Inc. doing business as PacTel Teletrac ("Teletrac"), by their attorneys, hereby reply to the comments filed on July 23, 1992.

2. The interim automatic vehicle monitoring ("AVM") rules have been in place some eighteen years.^{1/} Those interim rules were adopted to permit the development of wideband pulse-ranging AVM systems. According to the 1974 Report and Order:

The Commission finds that the allocation of spectrum in the 900 MHz band for the licensing of wideband systems is in keeping with an objective of allowing full scope for the development of

1. Report and Order, Inquiry as to Automotive Vehicle Locator Systems in the Land Mobile Radio Services, 30 RR2d 1665 (1974) ("1974 Report and Order").

AVM techniques. Accordingly, we are providing for wideband AVM operation in the frequency bands 904-912 and 918-926.^{2/}

At the same time, the Commission encouraged the development of narrowband systems such as proximity sensing, also called "signpost," systems^{3/}. These systems were to be given developmental licenses and placed at 903-904 or 926-927.^{4/}

3. In reliance on those rules, and after significant research and development Teletrac began to build and deploy wideband, pulse-ranging, high-capacity AVM systems, designed to tolerate interference from ISM and government systems in full compliance with the 1974 interim rules. Through its experience with this technology, Teletrac determined that the rules needed to be modernized if the benefits of these high capacity state-of-the-art systems were to be realized by consumers. Teletrac also discovered that, contrary to the 1974 rules, certain entities had obtained authorizations to operate non-complying narrowband, proximity-sensing (signpost) systems in the spectrum specifically authorized only for wideband pulse-ranging applications. Those non-complying signpost

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2. 1974 Report and Order ¶ 10, 30 RR2d at 1670. Indeed, the Commission stated quite clearly that it had proposed to allocate this spectrum for wideband AVM allocations employing a pulse-ranging, multi-lateration technique that can tolerate interference from government and ISM operations. These wideband pulse-ranging systems were to be designed for high capacity uses involving location and supplemental message data for upwards of 10,000 vehicles. 1974 Report and Order ¶ 9, 30 RR2d at 1670.
 3. 1974 Report and Order ¶ 7, 30 RR2d at 1668. ("Vehicles are located by their proximity to fixed posts (signposts).")
 4. Id. ¶ 12, 30 RR2d at 1671. Signpost systems can operate in the wideband segment on a secondary basis with no greater than 250 milliwatts of output power. 47 C.F.R. § 90.239(e)(3).

systems were capable of substantially degrading wideband pulse-ranging AVM service. Moreover, the lack of permanent rules made it difficult to attract capital to this technology and equipment vendors were reluctant to devote resources. In order to maximize the benefits to consumers from the variety of services that Teletrac-type AVM can provide, Teletrac filed its Petition on May 26, 1992, so that permanent rules could be adopted within a reasonable time to bring certainty to the AVM industry.

4. The Commission requested public comment on the Teletrac Petition on June 23, 1992. Fifteen comments were filed in response to that Notice. Several comments filed specifically support many of the rules proposed by Teletrac (MobileVision, Location Services), or generally support the need for a rulemaking (e.g., Comments of MobileVision, Southwestern Bell Corporation, Location Services, Mark IV)^{5/}. Several comments, however, oppose granting the Petition. These comments were filed by: Amtech Corporation ("Amtech"), a manufacturer of narrowband signpost systems; several of Amtech's users^{6/} and an Amtech venture called Amtech Logistics Corporation;^{7/}

-
5. Mark IV would prefer a notice of inquiry to a notice of proposed rulemaking, but has advanced no persuasive reasons for that preference.
 6. Oklahoma Turnpike Authority, Conrail, Association of American Railroads, Greater New Orleans Expressway Commission, American President Companies, American Trucking Association, Amtech Logistics Corporation, City of Los Angeles Department of Airports.
 7. American President Companies ("APC"), a partner in Amtech Logistics, filed comments. The joint venture, Amtech Logistics, also filed. Amtech owns 31% of Amtech Logistics. APC is a shareholder in Amtech Logistics and a senior officer of APC sits on Amtech's Board.

Pinpoint, a developer of a wideband pulse-ranging technology that has never been field tested or licensed;^{8/} and Allen-Bradley Co., Inc.,^{9/} a developer of a narrowband system operating by waiver in the 915 band.

5. The weight of the comments filed supports a proceeding to adopt permanent AVM rules. The Commission should adopt the rule framework proposed by Teletrac, a commercially deployed provider of AVM services. If, however, the FCC does seek comments on other proposals as part of a notice of proposed rulemaking, it should do so only as to issues which have substantive basis. Merely putting forward an "issue" does not make that issue real and, as we discuss below, many of the so-called "issues" addressed are simply bogus and are intended to cause delay in the adoption of permanent rules. Rulemaking proceedings which require parties to spend inordinate amounts of time responding to unreal "issues" waste the Commission's and the parties' resources.

6. Moreover, the Commission should take steps to prevent persons who are not properly in 904-912 and 918-926 MHz from using delay to expand their improper presence in the existing wideband allocation during the pendency of the proceeding. These steps should be taken before a license is granted, accomplished by either freezing all AVM applications from the date of Teletrac's Petition, or by a requirement that all applicants

8. Pinpoint is represented by Amtech's counsel.

9. Allen-Bradley, we have been informed, is also represented by Amtech counsel, although perhaps not in this particular proceeding. Allen-Bradley obtained a waiver of the Commission's rules to operate at 915 MHz.

after the date of Teletrac's Petition demonstrate that they will not interfere with existing licensees.

I. BACKGROUND

A. The Teletrac Petition.

7. Teletrac's Petition seeks to have the Commission replace its "interim" AVM rules, adopted in 1974, with rules permitting wide scale deployment of commercially available AVM systems. Teletrac uses wideband pulse-ranging technology with multiple receiver sites enabling the user to receive instantaneous location information. (Teletrac Petition ¶ 6). With its low-cost, highly-reliable radio location units ("RLUs"), Teletrac can make a number of wide area AVM services available to the mass market. These include stolen vehicle recovery, fleet management and emergency services, and, in the near future, services designed to locate people and objects. (Id. ¶¶ 10-20).

8. Teletrac systems began commercial operation in Los Angeles, Detroit, and Chicago in 1991 and in Miami and Dallas in 1992. Houston is scheduled to begin operation on December 1, 1992. Given the recent commencement of service, Teletrac's

number of customers^{10/} is still far less than the 16 million RLUs each system is capable of serving at maturity. (Teletrac Petition ¶ 9).^{11/}

9. The interim AVM rules lack modern technical specifications and equipment authorization procedures and do not provide adequate protection against interference between systems. In addition, the interim rules only provide for locating vehicles, although existing technology has evolved far beyond vehicular use. Finally, the interim rules discourage investment simply because they are interim. (Teletrac Petition ¶ 23). In order to resolve these problems, Teletrac proposed that:

a. The definition of AVM be modified to include the technology's functional capabilities -- its ability to monitor all animate and inanimate objects. (Teletrac Petition ¶ 28).

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10. Teletrac's rapidly growing user base is far greater than the 6000 claimed for Teletrac by Amtech. (Amtech Comments at 2). Interestingly, Amtech claims it serves 400,000 vehicles, but says nothing about the number of customers it serves. (Amtech Comments at 1-2). In fact, Amtech claims to have only 1309 transmitters. (Id. at 40). Moreover, Amtech's 400,000 figure includes "transportation equipment" (id.) meaning, presumably, something other than vehicles. Thus, the figure seems (a) substantially inflated, and (b) may include uses other than vehicles which may be outside the scope of the existing AVM rules. Amtech admits that the Amtech tags are in use on shipping containers and aircraft pallets (id. at 13), and one customer has over 10,000 tag reader customers. (Amtech Comments, Appendix A at 6).
 11. Teletrac has far fewer number of system licenses than Pinpoint implies. Pinpoint has aggregated all of Teletrac's "land station locations" and claims that this has significance. (Pinpoint Comments, Attachment A). It does not. For example, Teletrac has numerous sites now operating in the Los Angeles area, but several of those sites operate under a single license.

b. The 8 MHz allocation for wideband pulse-ranging systems be continued especially as these types of systems are now in operation and providing the kind of services the Commission had hoped for in 1974. (Id. ¶ 29). In addition, Teletrac recommended that the Commission establish standardized forward links. (Id. ¶¶ 30-31).

c. Narrowband systems, such as Amtech, would continue to be licensed in 903-904 and 926-927 MHz, but without a developmental restriction. (Id. ¶ 32). In addition, the Commission could allocate 902-903 and 927-928 MHz, which had been reserved for future allocation to narrowband systems and all non-900 MHz frequencies designated in the interim rules would continue to be available to narrowband system users. (Id. ¶ 32 n.34 and Appendix 1).

d. All existing licenses should be grandfathered. Thus, for example, under the Teletrac proposal, none of the existing Amtech licenses would be required to be moved to a different band. (Id. ¶ 50).

e. Co-channel separation should be adopted to maximize system capacity, protect service quality, and encourage development of new services. (Id. ¶ 33). Specifically, Teletrac proposed that there be no change in the hierarchy of uses presently characterizing this band. Thus, under Teletrac's proposal, it would not have exclusive use of the band.

f. The application and build-out requirements should be flexible (Id. ¶ 46), encouraging the efficiencies inherent in multimarket AVM networks. (Id. ¶ 48).

B. The Comments Filed.

10. As noted earlier, the comments fell into three categories: opposition to a rulemaking and the Teletrac Petition; support of the concept of a rulemaking, but disagreement with Teletrac's proposals; and strong support for Teletrac's proposed solution to the problems facing wideband pulse-ranging systems in the real world.

1. The Opponents.

a. Amtech.

11. Amtech manufactures signpost systems used for automatic toll collection and other transportation uses. (Amtech Comments at 4). The Amtech technology relies on a "reader" and a "tag," which are intended to operate when the reader and tag are in close proximity. (Amtech Comments at 6). It is a proximity sensing system as the term was used in the 1974 Report and Order.^{12/} Amtech, based on the Commission's interim rules, does not belong in the 904-912 and 918-926 MHz bands. Nonetheless, Amtech, by admission of a member of its Board of Directors,^{13/} and customers^{14/} has been using

12. 1974 Report and Order ¶ 7(a)(1), 30 RR2d at 1668.

13. APC Comment at 2. ("All of the AEI equipment we have installed operates in the 902-928 MHz portion of the frequency spectrum, and the full band must be available . . .").

14. Oklahoma Turnpike Authority Comments at 2. ("Our AVM system operates in the 902-928 MHz frequencies and requires use of nearly all of the channels available in these bands.")

the entire 902-928 MHz band, and is now apparently seeking to delay a rulemaking process through the filing of various comments so that it may continue to fill these bands with additional non-conforming tags and transmitters. Narrowband signpost systems, such as Amtech's, do provide significant public benefits. However, that does not mean Amtech can simply disregard existing regulations and thwart deployment of new technologies and services, such as Teletrac's, legitimately operating in these bands. (Cf. 47 U.S.C. § 157(a)). There is a place for Amtech, but not in the 904-912 and 918-926 MHz segments.

12. Apparently, Amtech has been able to avoid complying with the narrowband requirements since it began operation in the late 1980's.^{15/} Amtech does not claim it complies with any of the existing rules. Amtech's need to use large portions of 902-928 MHz stems from the fact, among others, that its lack of spectrum efficiency requires a 2 MHz separation between each of its tag readers. (Amtech Comments at 9). Teletrac has submitted the affidavit of Dr. Jeffrey Krauss, an independent telecommunications consultant, who has reviewed Amtech's spectrum use. (Attachment A to this Reply.) Dr. Krauss states:

It is my conclusion that the Amtech system operating in the 902-928 MHz range makes very inefficient use of the radio spectrum. Specifically, the output power, duty cycle, channel spacing, frequency stability and the unregulated nature of the tags all contribute to spectrum inefficiency. As a

15. Despite Amtech's efforts to claim a long lineage of commercial operation, Amtech predates Teletrac in commercial operation by only a few years. Given the significant difference in cost and sophistication between the two technologies, it is not surprising that it took Teletrac some years to come to the marketplace.

matter of sound policy, the FCC should take a number of steps to improve the spectral efficiency of this and other RF Identification systems.

Krauss Affidavit ¶ 3.

13. Amtech now states that the "wideband" and "narrowband" distinctions codified in the Commission's rules in 1974 are irrelevant. (Amtech Comments at 22). Amtech admits that it originally operated on the edge of the wideband allocation -- e.g., 904, 912, 918 and 926 -- when it began operations in the late 1980's. (Id. at 23). However, those Amtech systems were questioned by the staff. (Id.). As a result, in 1990, Amtech placed its signal 10 kHz further into the band, i.e., 911.990, 918.010, 904.010, and 925.990 MHz. In fact, Amtech is not now operating at the band edges, nor only 10 kHz further in. It is operating throughout the wideband allocation in contravention of the rules with no legal basis for doing so.

14. Statements of the FCC staff at meetings, such as those construed by Amtech to authorize its operations (Amtech Comments at 22-24), are not decisional. The staff cannot rewrite the rules by "discussion" and Amtech may not rely on whatever informal advice it may believe it received as a justification for non-compliance:

[I]t is elementary that an agency must adhere to its own rules and regulations. Ad hoc departures from those rules, even to achieve laudable aims, cannot be sanctioned, Teleprompter Cable Systems v. FCC, 543 F.2d 1379, 1387 (D.C. Cir. 1976), for therein lie the seeds of destruction of the orderliness and predictability which are the hallmarks of lawful administrative action. Simply stated, rules are rules, and fidelity to the rules which have been properly promulgated, consistent with applicable statutory requirements, is required of those to whom

Congress has entrusted the regulatory missions of modern life.^{16/}

15. In this proceeding, Amtech has apparently decided upon a strategy of delay. To achieve that delay, during which Amtech presumably will seek to place substantial numbers of additional tags in operation,^{17/} Amtech has advanced numerous issues in its comments which divert from the modernization of the AVM rules and which seek to leave the wideband allocation to Amtech, which is not a wideband system or even a competitor for wide area services. Thus, at its core, Amtech's effort is to subvert the process so that Amtech is not required to locate its future tag reader systems in another band, even though those systems are capable of operation anywhere between 850 - 950 MHz and 2435 - 2465 MHz.

b. Amtech Users.

16. The thrust of the Amtech users'^{18/} opposition is unfounded fear that their tag readers would be displaced. However, Teletrac's proposal to "grandfather" existing licensees is not a displacement proposal. Moreover, Teletrac considered the spectrum needs of new entrants as well, by recommending removal of the developmental restriction

16. Reuters Ltd. v. FCC, 781 F.2d 946, 950-51 (D.C. Cir. 1986).

17. According to Dr. Krauss, these tags may emit more radio energy both inside and outside the AVM band than is permitted by FCC rules. (Krauss Affidavit ¶ 29).

18. The Amtech users are those commentators who are either customers of Amtech or have affiliates using the Amtech system.

on 903-904 MHz and 926-927 MHz to these bands for future entrants. In addition, 20-50 MHz, 150-170 MHz and 450-512 MHz would remain available.^{19/} Finally, 912-918 MHz could be allocated to tag readers and 902-903 and 927-928 MHz have been held in reserve.

17. A secondary theme of the Amtech users is that Teletrac's proposals would thwart their plan to create a seamless international system for toll tag readers. These Amtech users, however, apparently are unaware that 912 MHz is not available for AVM in Europe and other parts of the world because this frequency, among others, has been allocated to GSM, the digital mobile telephone service. Therefore, this claim has no merit.

18. Several of the Amtech user comments are at best somewhat misleading because they fail to disclose significant information. American President Companies ("APC") submitted comments signed by James S. Marston, Senior Vice President and Chief Information Officer of APC. However, APC fails to disclose that Mr. Marston, as of December 31, 1991, was a Director of Amtech. (See Exhibit 1 to this filing, taken from Amtech's 1991 Annual Report to Shareholders.)

19. Further, APC and the comments of Amtech Logistics Corporation fail to disclose yet another tie between these commentators. APC does not disclose in its comments that it is a stockholder in Amtech Logistics, along with Amtech. Amtech

19. In addition, 2450-2500 MHz may be available. We note Amtech has equipment operating in this band.

Logistics' comments disclose that Amtech owns a "minority interest" (31% of the stock), but fails to mention APC's equity interest, only stating that "transportation companies own an interest." A copy of the relevant portions of Amtech's 1991 10-K is attached as Exhibit 2. Thus, it is fair to say that entities economically tied to Amtech have been filing multiple comments that fail to disclose the true relationship between the parties.

20. The Association of American Railroads ("AAR") and the American Trucking Association ("ATA") have also filed comments in opposition to the Teletrac Petition, claiming they have each adopted a standard which requires use of frequencies in the 912 MHz range. The Commission should consider carefully the content and status of these standards. First, the AAR AEI standards became effective in 1992; they can hardly be said to be longstanding. Second, all of the other standards referenced by Amtech are "voluntary." (Amtech Comments, Attachment A). Third, AAR's application of these standards may violate FCC technical rules. (Krauss Affidavit ¶ 29.) Fourth, Teletrac's proposed rules would not require any modification to or displacement of installed railroad equipment and would accommodate future growth at no extra cost.

c. Pinpoint.

21. Pinpoint claims to have a wideband pulse-ranging technology similar to Teletrac's, although it is apparently years away from commercial availability. Predictably, as Pinpoint's comments were written by Amtech's counsel, Pinpoint's objections mirror Amtech's. Since Pinpoint has undertaken no significant testing, its "robustness" claims for

its system must be taken with a good deal of skepticism. Pinpoint claims it can provide service in a shared environment. The Pinpoint system is designed for 24 MHz.^{20/} Pinpoint claims to need at least 8 MHz, but for the accuracy required for consumer services, Pinpoint needs at least 16 MHz. (Pinpoint Comments at 27).

d. Allen-Bradley.

22. Allen-Bradley operates on 915 MHz through a waiver granted by the Commission. Allen-Bradley uses a narrow-band technology indoors to monitor product parts as they move through an assembly line. Despite its express acknowledgment that Allen-Bradley is not directly affected by Teletrac's proposal, this company filed an opposition based on its fear that the band it is operating in under waivers, 912-918 MHz, would become crowded with AVM operators. This commentor also supports Amtech and Pinpoint and recommends opening 902-928 MHz to all who may want to enter provided they do not interfere with Allen-Bradley's operation. (Allen-Bradley Comments at 6).^{21/}

20. Pinpoint was granted special temporary authority by the Office of Engineering and Technology in June 1991 to conduct propagation studies using a 24 MHz bandwidth transmitter within the 902-928 MHz band. Such a transmitter could not be licensed as a wideband AVM system under the existing rules.

21. If Amtech were to move its operations to the 912-918 MHz band, it would not interfere with commercial AVM operators such as Teletrac. Amtech does not appear to oppose such a move. While Allen-Bradley does oppose Amtech's operations in this band, we note that the applications described by Allen-Bradley are primarily indoor applications which should generally be able to co-exist with Amtech's which are primarily outdoor applications. The Commission has adopted different technical specifications for products
(continued...)

2. The Rulemaking Supporters.

a. Mark IV.

23. Mark IV does not describe its technology nor provide any analysis. Mark IV supports the adoption of permanent rules although it seems to oppose Teletrac's proposal and, instead, asks for a Notice of Inquiry proceeding -- a process the Commission knows can take years during which time the ability of AVM providers to expand and enhance AVM technology and services continues to be stalled. Mark IV's suggestion that Teletrac's proposal does not begin to meet its needs is essentially the same argument put forward by the Amtech parties: they are in this band now, regardless of how they got there, and they should be able to continue using the entire spectrum, regardless of whether their service interferes with other applications and regardless of whether they could relocate to other frequencies.

b. Southwestern Bell.

24. Southwestern Bell Corporation ("SBC") supports adopting permanent rules and the goals identified by Teletrac. SBC also proposes a drawn out comment period to examine technical proposals. Without any technical support, SBC claims it is "investigating technologies" which might, someday, permit the use of 4 MHz allocations. (SBC

21.(...continued)

used indoors that take into account the additional shielding afforded by buildings. 47 C.F.R. § 15.245(b)(1)(i).

Comments at 3). However, all prospective licensees who have seriously investigated these technologies know that the full benefits of AVM technology cannot be achieved absent an 8 MHz allocation. (See, e.g., MobileVision Comments at 13 and Attachment A at 11). SBC assumes that co-channel separation is necessary but proposes using cellular-carrier type boundaries. Finally, SBC asserts that comments are necessary on both the "grandfather" and the application/licensing proposals. (Id. at 6).

c. MobileVision.

24. MobileVision, an AVM license holder in the 918-926 MHz segment, supports the adoption of permanent rules and the technical concepts included in Teletrac's proposal. It appears that MobileVision's support is based in large measure on its experience with wide-band pulse ranging AVM technology and its awareness of the impediment to progress created by the interim rules. (MobileVision Comments at 4). MobileVision suggests some changes to Teletrac's proposal, such as requiring a demonstration of technical capability before a new applicant could be licensed and adjusting the proposed construction schedule. (Id. at 16-17). MobileVision believes Teletrac's analysis underestimates the problems of co-channel interference. (Id., Attachment A at 1).

d. Location Services.

25. Locations Services ("LS"), another AVM license holder in the 918-926 MHz segment, also supports the goals and objectives as well as the technical analysis set out by

Teletrac. Location Services encourages the Commission to consider relocating the narrowband license holders instead of "grandfathering" them because of the serious interference problems they present. (LS Comments ¶ 7, at 4).

**II. THE TELETRAC PETITION SHOULD BE
GRANTED AND TELETRAC'S PROPOSED
RULES SHOULD FORM THE FRAMEWORK
FOR PERMANENT RULES.**

26. Although there are a number of arguments put forward in opposition to the Teletrac Petition, none of those arguments have any real technical or logical support. Nothing in the comments substantively undermines Teletrac's Petition. The proposed rules advanced by Teletrac should form the infrastructure of the permanent AVM rules. Set out below is Teletrac's analysis of each of the arguments advanced against the proposed rules.

**A. Co-Channel Separation Is Essential to
a Viable Commercial AVM System.**

**1. Spectral Inefficiency in a Shared Band
Creates a "Tragedy of the Commons" for
AVM Services.**

27. As noted in Teletrac's Petition, "The Tragedy of the Commons" can lead to the destruction of a radio band. (Teletrac Petition ¶ 35).^{22/} A user of a shared band must have an incentive not to ignore the impact of its operation on other users in the

22. See generally, Garrett Hardin, "The Tragedy of the Commons," Vol. 162 Science 1244 (1968).

band. When a shared band user does not operate efficiently, by raising power or engaging in transmission for a greater period of time than needed, increased interference flows to others in the band. (*Id.*). The "Tragedy of the Commons", in fact, is illustrated by Amtech's own operations.

28. As Dr. Krauss points out in his affidavit, Amtech has engaged in a variety of spectrally inefficient practices to the detriment of Teletrac and others who are legitimately operating in the wideband segments. For example, the Amtech RF Module is licensed to operate at 2 watts output power. (Krauss Affidavit ¶ 5). For most intended uses, the distance between the reader and the tag should be approximately 15 feet or less. (*Id.* ¶¶ 6-7). Amtech also has equipment operating in the 2435-2465 MHz band needing only 5 milliwatts output power. (*Id.* ¶ 8). This higher frequency unit appears to be operationally similar to Amtech's 900 MHz band unit. Dr. Krauss concludes that 2 watts is more power than is needed for most 900 MHz installations. Furthermore, Amtech's output power at 900 MHz appears to violate the interim AVM rules. Amtech's is a signpost system. (Krauss Affidavit ¶ 11.) Section 90.239(e)(3) of the Commission's AVM rules requires:

Transmitters to be operated at signposts, or from vehicles to signposts for locations signalling purposes may be employed with output power not to exceed 250 milliwatts (Emphasis supplied).

Thus, Amtech's output power fails to comply with the Commission's existing rules. In a shared environment, the "Tragedy of the Commons" makes it unlikely that Amtech will voluntarily reduce power.^{23/}

29. Amtech's duty cycle is subject to the same analysis. Amtech's Model AR2200 transmits continuously. (Krauss Affidavit ¶ 15). Much lower duty cycles are possible. (*Id.* ¶ 16). As Dr. Krauss explains: "This continuous transmission unnecessarily pollutes the radio frequency environment." (*Id.*). The "Tragedy of the Commons" ensures this result.

30. Channel spacing difficulties occur as well with Amtech. Amtech claims to need frequency separation of at least 2 MHz. (Amtech Comments at 9). Thus, Amtech users claim to need all or most of 902-928 MHz because of channel spacing requirements. (*See, e.g.*, APC Comments at 2). Dr. Krauss points out:

I see no reason for the requirement imposed by Amtech that transmitter frequencies be separated by at least 2 MHz. I would expect that a 300 kHz channel spacing would be fully satisfactory with affordable reader/receivers, and this could be reduced if better quality filters were employed in the receivers. Although the initial signal is a CW signal at a single frequency, it is modulated in the tag by a 40 kHz frequency shift keyed signal. The Necessary Bandwidth for a 10 kbits/sec. data rate carried on such a signal, using the methods of Section 2.202 of the Commission's Rules, should be about 100 kHz. The receiver bandwidth, according to Amtech, is 130 kHz. *Id.* The difference between this bandwidth and the calculated Necessary Bandwidth could be accounted for by inexpensive filters employed in the receiver.

23. Amtech does not claim that its systems operate with no greater than 250 milliwatts of output power, or that they operate on a secondary basis to wideband pulse-ranging systems. *See* 47 C.F.R. § 90.239(e)(3).